CALIFORNIA ACADEMY OF MEDICINE.

Regular Meeting, June 29, 1909.

Reports of Two Cases of Head Injury Followed by Mental Disturbances.

By PHILIP KING BROWN, M. D., San Francisco.

The first case illustrates more pointedly the change in disposition in a man whose frontal lobe had an injury and secondly the influence upon this man of a moderate use of alcohol. The history was as follows:

Patient male, 42 years of age, engineer. Had had an injury to the head after which the wife noted mental disturbance. At the time of the injury in a train wreck eight years before the skull was fractured, both legs broken and the arm taken off. He was ill in the hospital nine months and delirious for four months. The injury was on the forehead over the left eye and discharged for four months. The wife states that there is a loss of memory, an incoherence of activities, amnesia, irritability, insomnia, nervousness, jerkings in sleep and loss of weight. Prior to the accident patient had always enjoyed good health. Patient complains of no headache although his wife says that he rubs the left side of his head sometimes. His mental condition had always been extremely good, patient never drank nor smoked prior to accident. Occasionally had taken whisky but without any effect whatever on the mental condition. While the patient was in the hospital after the injury and during delirium he broke out of the window and was only brought back with difficulty; it is not known what precipitated this special outbreak. The wife states that he has shown signs of forgetfulness to an increasing degree since he left the hospital. He would start to go down town but could not recall afterwards what he went for and where he was going and on going out of a building did not know which way to go home. He began to be less tidy in appearance, to swear, to drink and to show signs of increasing irritability, a single glass of beer would increase these symptoms so much that he would not know where he was for a day nor could he remember anything he did. He has been recently confined for three months in an asylum and while there has been violent at times. This followed an excess of alcohol. There never have been any convulsions. During the past eight years he has complained a good deal of insomnia. His eyes were examined by Doctor Redmond Payne who found nothing. Doctor Payne suggested that the frontal sinus had been infected, and he advised a radiogram which, however, showed nothing. The patient was operated upon by Doctor Walter B. Coffey and spicules of bone ½" long, almost all around the scar, and projecting into the brain were removed. Ten days after the operation patient stated that his mind was more clear than at any time for years, that formerly where he had remembered nothing and would do things without remembering them afterwards he was now perfectly clear as to his actions. He stated that some change had occurred in his brain to make his life seem like starting anew.

Case No. 2—This case illustrates the uselessness of operation after lapse of too much time and onset of indications of permanent brain change (epilepsy). Patient, male, age 33. He complains of a dazed condition of his mind. Has had four generalized epileptic convulsions. Some eight years ago had an injury to the head since when he is indifferent to his work and has a happy go lucky air which he says is not normal to him. Is easily affected by alcohol and for that reason has not taken anything for years, although he has the appearance of one who drinks. Patient has always enjoyed good health up to the accident to his head; this occurred by being hit on the head by a flat car from which a 4x4 beam projected; at the time he says he was not badly hurt, but his wife noticed that his speech was wandering. One year ago patient had a severe general epileptiform seizure without warning. Since then he has had three or four others. Since the first seizure the mental condition has grown worse. Examination reveals a scar over his right forehead and evident depression of the outer plate of the skull. Tenderness over the left parietal region near arm center, twitching of thumb and index finger of right hand. There were no eye symptoms and no involvement of the cranial nerves, he has a silly smile and the manner of a man under the influence of alcohol, but what was striking was the serious desire of the patient for relief and the evident recognition of all his failings. Doctor Coffey performed the operation for relief of the probable depressed fracture over the frontal lobe. There was no relief and he became so foul in his talk and so profane that he had to be sent to the Detention Hospital. From there he was removed to the City and County Hospital where the motor area on the other side was trephined and a thickening on the dura removed by Doctor Terry. Surgically he made a good recovery but his mental condition grew worse and he became violent and a few weeks later he was sent to the Mendocino State Hospital where he was fed with a stomach tube as he refused food and medicine. Three months later he died without having improved.

Report of a Case of Fracture of the Sixth Spinal Vertebra, Treated by Suture of the Cord. Death on the Sixty-seventh Day.

By T. W. HUNTINGTON, M. D., San Francisco.

My interest has centered, during the past few weeks, on a case of fracture of the sixth spinal vertebra which came under my care April 24th, 1909.

The patient was a robust man, age forty-four, living in a remote part of the state. Family history and past history, negative. He had been actively engaged in business life and was an unusually strong man.

On April 24th, 1909, he was rolled beneath a wagon in such a way that his forehead struck the ground, his body being forced backward over his head. Fifteen minutes later, he was picked up by friends. He realized from the outset that the lower portion of his body was paralyzed. The local doctor found total paralysis of the body from a point two inches above the nipple line. The paralysis involved the anterior muscles of the arm and forearm, there being slight movement of the deltoid and posterior muscles of the forearm. The intercostals were paralyzed and respiration depended upon the diaphragm. Sense of heat and cold were absent throughout the affected area.

I saw him first on the 26th of April and verified the above observations. At this time, his muscles were uniformly flaccid, although the sphincters were not relaxed. There was inability to evacuate the bowels and bladder. Pupils were normal in size but entirely stationary. The head was freely movable in all directions by voluntary effort including rotation. Patient resented any effort at traction of the head upon the spine. The following reflexes were manifest at this time, the patellar, cremasteric and ankle clonus. A Babinsky was manifest bilaterally. The patient was placed upon a rubber water mattress and was left in charge of Dr. T. G. Russell, who preceded me to the case. The conditions remained stationary for one week, when he was brought to this city after a three day's journey, arriving on the 5th of May, 1909.

Upon his arrival, he was seen by Drs. Kerr, Newmark, Terry, Russell, Cooper and myself. An X-ray

taken by Dr. Cooper showed a double fracture of the body of the sixth vertebra. There was no evidence of fracture of the spinous process or of the laminae, nor could any deformity be discovered by palpation at this point. During the following five days, the case was carefully gone over from every point of view and the possibility of total division of the cord or of compression was fully discussed. My own feeling was that the patient had sustained a complete division of the cord at the time of injury, but there was disagreement upon this point.

An operation, for the relief of possible pressure, was undertaken on May 13th, 1909, in which I was assisted by Drs. Terry and Russell. Full ether anesthesia was well borne throughout. A vertical incision over the spinous process of the sixth cervical vertebra was made and the cord was easily exposed by a double laminectomy. On opening the spinal column, the first thing that attracted my attention was a transverse, slightly lacerated tear through the dura. Through this opening, a probe dropped readily to the bony structure behind and when moved laterally, met with no resistance until the lateral pillars of the dura were encountered. Dr. Terry thought that possibly some portions of the lateral columns of the cord remained intact, but I had no evidence of it. The cord was then sutured with two very fine chromocised catgut mattress sutures. These were passed directly through the dura, posteriorly and anteriorly to the cord and through the cord itself. When the sutures were tied, the approximation of the cord and dura seemed almost perfect. Wound closure was by the tier method and resulted in rapid, ideal healing. For the next week or ten days, the patient remained apparently as he had been prior to operation. At the end of two weeks, there was evidence of failure which was continuous to the time of his death on June 30th, 1909.

The first thing that attracted our attention after the operation was the exaggeration of some of the reflexes, notably, the patellar reflexes. The Babinsky was again manifest bilaterally. Nearly all the skeletal muscles were susceptible to the influence of irritation, and there was scarcely a single reflex in the lower part of the body which could not be elicited. There was, however, no suggestion of nerve regeneration over the paralyzed area. The presence of reflexes suggested to several of those who observed the patient the possibility that total division of the cord did not exist.

Upon this point, the findings of Goltz who, in 1896, published the results of extensive experimentation upon dogs are of peculiar interest. Goltz found that total division of the cord above the fifth cervical vertebra resulted in almost immediate death.

He, however, determined absolutely the viability of dogs from whom had been removed the entire spinal cord up to the sixth cervical vertebra. In some instances, dogs were kept living for some time after total destruction of segments of the spinal cord with a blunt instrument, the detritus being left in situ, but comparatively soon after such a procedure, toxic effects proceeding from the detritus, produced death; hence, it was found necessary to remove all the injured tissue and close the wound.

Under such a procedure, it was found that life could be maintained indefinitely. He found that the removal of the spinal cord was best done by a series of operations. In some cases, the spinal cord was simply transected as high as the sixth cervical, but the procedure was less dangerous when the transection was at a point further back. When done at the third thoracic, the animals survived uniformly. Careful precautions were taken to secure absolute, complete section. This was done by lifting the cord out of the canal and dividing it in full view. The second step was taken after the wound had completely healed and the animal had regained strength. The vertebral arches were then removed from a definite area and the cord exposed. The proximal end of the cord was seized with forceps and the spinal end roots cut away to the lower point of section. Here, another cross section was made and the segment removed. Some weeks after complete healing of the second operation, another segment was dealt with in a similar manner until, finally, complete removal of the cord was effected.

After the last operation, the usual trophic disturbance occurred such as skin ulcers and blisters. Ultimately, these lesions healed kindly after extreme precautions.

Goltz's conclusions are briefly as follows:

First—Much greater danger to the life of the animal lies in the lowering of the blood temperature than in disturbances of nutrition; in fact, cutting of the *cervical* cord is always likely to be fatal when the body temperature is not maintained. For this reason, the animal was kept, after operation, in a sheet-iron warm-water jacket, whereby normal temperature was preserved temporarily until later, when heat control was regained by the animal.

Second—After section of the cervical cord, the eyeballs sank deeply into the orbits, lids almost closed, pupils not much narrowed but were unresponsive to light. Voice, strongly changed, deep baying being replaced by weak, very high pitched tones. When taken from the water jacket for cleansing purposes, some of the animals were found to perspire freely, but this continued for only five or six days. Sweating was thought not to be due to super-heating for the head showed no trace of perspiration and breathing and circulation were normal. There was no lolling of the tongue and no dilatation of vessels of mouth and eyes.

A number of illustrations of the heightened reflex irritability of the spinal cord, after total division, are given as follows:

First—After extirpation of the whole cord, the reflexes were maintained temporarily. But the irritability of the skeletal muscles entirely disappears after some time has elapsed. The muscles lose their elasticity, become soft and flabby and finally, are transformed into strings of connective tissue.

The external sphincter ani regains its tone and does not degenerate, and the inference is drawn that in some circuitous fashion, the external sphincter is connected through the sympathetic and the central nervous system which is uninjured.

Second—The urine remained clear, free from sugar and albumen. At first, the bladder would become immensely distended without being subject to reflex evacuation. Gradually, this condition im-

proved. After some months, the bladder contracted spontaneously when stimulated by a certain accumulated pressure. The placing of a thermometer in the anus would cause bladder evacuation, but stimulus from a greater distance, as tickling of the foot, produced no effect.

Third—The cord, having been removed from a pregnant female, she brought forth normal young at full term; secreted milk normally at proper time.

Fourth—Vaso-motor changes could not be brought about by distant stimuli, but considerable adjustment to local temperature changes as shown by skin conditions, color, hyperemia, etc., was observed.

Several points in the history of the foregoing case of fracture of the spine with total division of the cord are interesting in connection with Goltz's experimental work. It will be remembered that the reflexes over the paralyzed area, though slight at first, assumed almost exaggerated activity during the two weeks following operation, but disappeared completely during the later days of the patient's life.

Sweating was noticed at the beginning, fixation of the pupils was constant throughout. The bladder and bowel conditions which followed were almost identically in line with Goltz's findings. Furthermore, there was rapid muscular degeneration after the first ten days. At varying intervals, there was a rising temperature to 102 to 105. Such an excerbation occurred during the last two days of the patient's life. This can be explained upon no other ground than a toxemia proceeding from the spinal cord detritus at point of injury. Toxemia, as an almost inevitable factor in the conduct of cases where extensive lesion to the cord has been sustained, seemed strongly to negative the possibility of successful cord suture, because of the fact that death will probably ensue from this cause before a regenerative process can be established. This is particularly true where total division of the cord can be demonstrated.

Taking all the evidence bearing upon cord suture, it seems highly improbable that such a procedure can possibly be of any value. Operations for conditions depending wholly upon compression of the cord, however, seem to offer sufficient encouragement to warrant further effort along this line.

Discussion.

Dr. Harry M. Sherman, San Francisco: The interest in these cases seems to me to center a great deal upon the diagnosis that is made before operation is undertaken and it is made more acute by the contention of late years that concussion of the cord does not occur. An injury occurring with no obvious upsetting of the line of spinous processes being present a diagnosis could be made of concussion of the cord and then operation done at a later time if the concussion symptoms do not clear up. But operation early or late discloses some things that seem to indicate that concussion of the cord must occur in some instances. I recall a patient who fell backward over a little walk in a garden to a path beneath, a few feet below, landing upon the back of his neck. He had at once complete paralysis below the level of the fifth cervical vertebra. A few days later I was told that the paralysis had cleared up somewhat and then had supervened again and at that stage I saw him. It seemed to me that he was having probably some hemorrhage producing pressure upon his cord and that the hemorrhage was extending up so that the pressure was getting very close to the respiratory center. I advised that the spinal canal be opened. We did this but the man died upon the operating table. I went on and removed that portion of the cord which was supposed to be implicated in the crushing and found that it had been a perfectly good spinal cord, there was no evidence of any injury to it, there had been no pressure upon it and the whole picture had to be changed in my mind. He must have had a concussion of his cord for while there was fracture through the body of a vertebra there was no displacement and no fracture of the laminae; as further evidence that he must have had concussion of his cord is the fact that the concussion symptoms were abating, sensation was returning and he had regained some power of movement. The symptoms which I thought were those due to the hemorrhage and secondary pressure were undoubtedly symptoms of an ascending paralysis and the man was in articulo mortis and he would have died just the same without intervention. This experience is not unique for I have heard and read reports of other cases in which laminectomies have been done on a diagnosis of a crushing of the cord and at operation the cord has been found to have been untouched. I think there is much testimony to offset the claims of those who say that concussion of the spinal cord is practically never seen.

Another case which was watched by Doctor Newmark and myself was that of a young man riding on a lumber wagon. He fell from the wagon and was caught on the back of his neck by the axle as he sat upon the road and forcibly flexed. He remembered very distinctly that after having been left he stretched his feet out and then all power of motion disappeared. He was in St. Luke's Hospital when Dr. Newmark saw him with me and upon that one symptom we held our hands and did nothing in the way of operation. The symptoms were those of complete separation of the cord in the mid dorsal region and he had a slight kyphosis but because he had been able to move after the accident we let him wait. He was ill for a number of weeks and had bed sores and all the symptoms going with section of the cord, but he recovered perfectly. Two years after I saw him racing after my carriage to stop me on the street and tell me how he was.

CONTRA COSTA COUNTY.

The Contra Costa Medical Society met at Dr. W. S. George's office in Antioch on July 11th, 1909. After the routine business was finished, Dr. George F. Hanson addressed the meeting on "Some Thoughts in Therapeutics," it being the custom of the society for two years past to get some man of note to address them, which they have found very beneficial, both in the way of acquiring knowledge and in getting the members out.

The following resolutions were unanimously passed:

"First, Resolved, That it is the sense of this society that we shall add the feature of Medical Defense to the advantages of membership in the State Society;

"Second, Resolved, That we pledge ourselves in the writing of our prescriptions to conform as nearly as possible to the United States Pharmacopoea and the National Formulary."

The next meeting will be held at Dr. Rattan's office in Martinez, September 12th, 1909.

FRANK RATTAN, Secretary.